Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting information

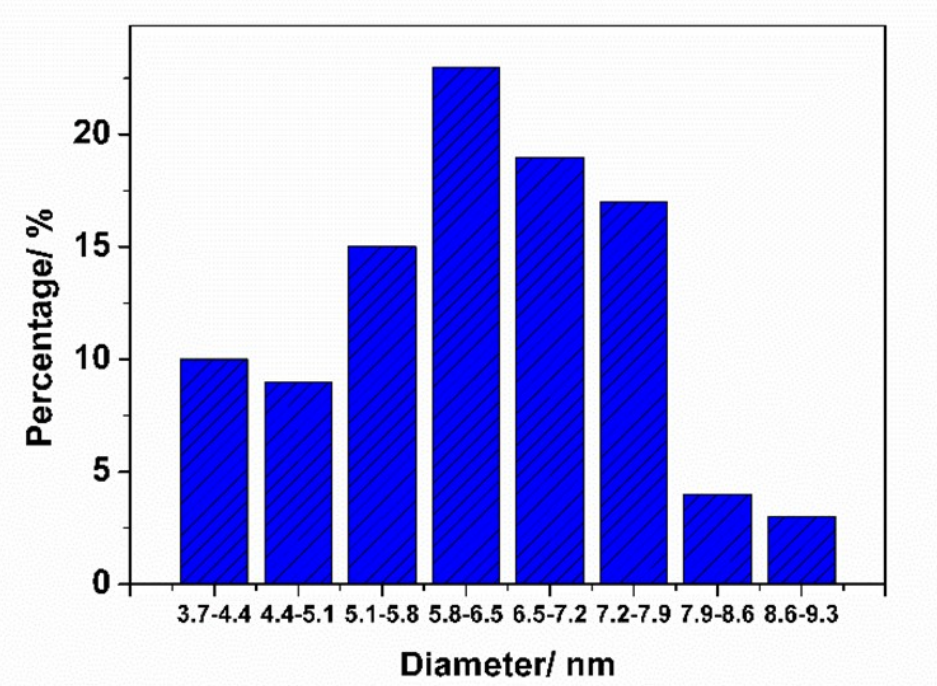

Figure S1. Size distribution of the PdNPs biosynthesized on *S. oneidensis* MR-1. Data from TEM images (Fig. 3D).

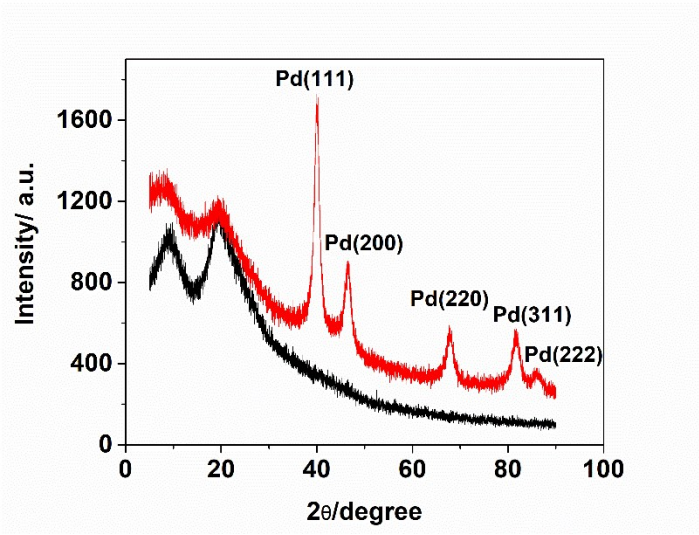

Figure S2. XRD spectra of *S. oneidensis* MR-1 before (black line) and after (red line) the exposure to 1 mM $Na_2[PdCl_4]$. Each sample was scanned in the θ-range of 5-90 °.

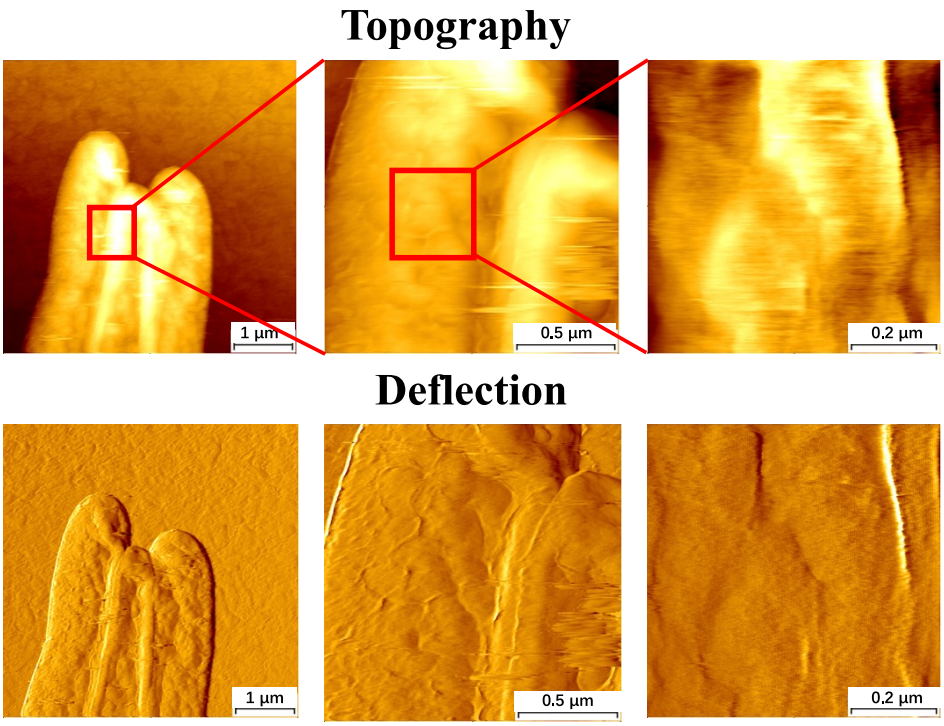

Figure S3. Tapping mode AFM images of *S. oneidensis* MR-1 cells with PdNPs on Pt sheet (1.0 ×1.0 cm^2).

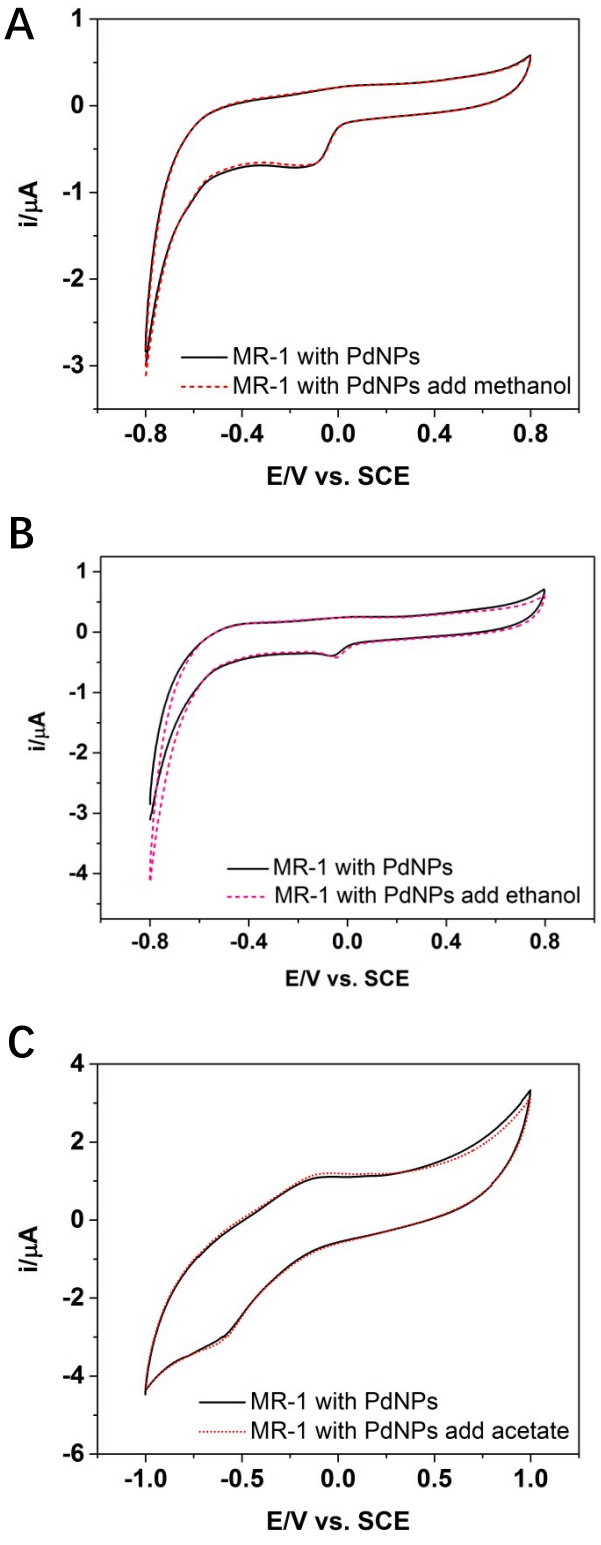

Figure S4. CVs of *S. oneidensis* MR-1 with bio-PdNPs modified GC electrode in 0.10 M pH 7.0 phosphate buffer (solid lines) and in the presence of 100 mM (A) methanol; (B) ethanol and (C) acetate (dotted lines), at a scan rate of 10 mV/s.

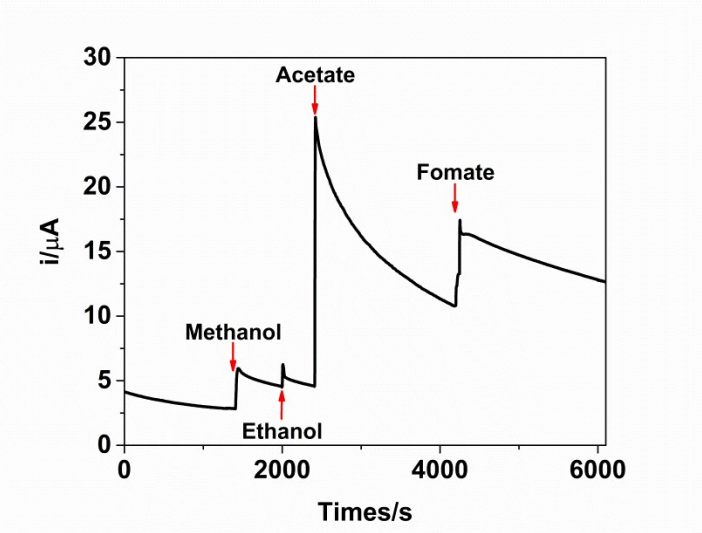

Figure S5. Chronoamperometric curve of methanol, ethanol, acetate, and formate oxidation at electro-deposited Pd modified GC electrode. The potential held at 0.10 V in 0.10 M pH 7.0 phosphate buffer solution. Final concentrations of methanol, ethanol, acetate, and formate are 0.10 M.

Reference

1. Mikheenko, I. P.; Rousset, M.; Dementin, S.; Macaskie, L. E., Bioaccumulation of palladium by Desulfovibrio fructosivorans wild-type and hydrogenase-deficient strains. *Appl Environ Microbiol* **2008,** *74* (19), 6144-6.

2. Hennebel, T.; De Corte, S.; Verstraete, W.; Boon, N., Microbial production and environmental applications of Pd nanoparticles for treatment of halogenated compounds. *Curr Opin Biotechnol* **2012,** *23* (4), 555-61.

3. Ng, C. K.; Tan, T. K. C.; Song, H.; Cao, B., Reductive formation of palladium nanoparticles by Shewanella oneidensis: role of outer membrane cytochromes and hydrogenases. *Rsc Advances* **2013,** *3* (44), 22498-22503.

4. Babauta, J. T.; Nguyen, H. D.; Beyenal, H., Redox and pH Microenvironments within Shewanella oneidensis MR-1 Biofilms Reveal an Electron Transfer Mechanism. *Environmental Science & Technology* **2011,** *45* (15), 6654-6660.

5. Cao, B.; Shi, L.; Brown, R. N.; Xiong, Y.; Fredrickson, J. K.; Romine, M. F.; Marshall, M. J.; Lipton, M. S.; Beyenal, H., Extracellular polymeric substances from Shewanella sp. HRCR-1 biofilms: characterization by infrared spectroscopy and proteomics. *Environ Microbiol* **2011,** *13* (4), 1018-31.